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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,217	03/19/2001	Susumu Saito	Q63511	6911

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EXAMINER
PHAM, HAI CHI

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2861	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/810,217	Applicant(s) SAITO ET AL.	
	Examiner Hai C Pham	Art Unit 2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) ~~filed on~~ *RCE (04/08/03) & Amendment (03/10/03)* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,10 and 11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,10 and 11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 04/08/03 for a Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 09/810,217 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4, 7, 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. (U.S. 5,999,345) in view of Kitamura (U.S. 4,393,387).

Nakajima et al. discloses a multi-beam optical scanning apparatus comprising two semiconductor laser light sources (LD1, LD2, Fig. 6) each including a plurality of light emitting devices arranged in a line at equal intervals, a beam scanner (rotating polygon mirror 403), a beam converging unit (cylinder lens 402), and a controller for always controlling an inclination angle ($\theta 1$, $\theta 2$) of said plurality of light emitting devices (LD1-R, LD1-L, LD2-R, LD2-L) with respect to a beam scanning direction of each of said semiconductor laser light sources (Fig. 7).

However, Nakajima et al. does not explicitly disclose the equation governing the inclination angle.

Regardless, the relationship between the inclination angle of the semiconductor laser light source, the magnification of the entire optical system of the scanning apparatus and the interval of the laser beam spots on the scanning surface is well known in the printing art as evidenced by Kitamura. In fact, Kitamura discloses a beam recording apparatus performing parallel scanning with a plurality of beams on an image recording medium, the apparatus comprising a semiconductor laser source (1, Fig. 1) including a plurality of light emitting devices (a, b, c, Fig. 2) arranged in a line at equal intervals (A), a beam scanner (polygon mirror 3), a beam converging unit (condensing optical system 2) disposed between the laser light source and the beam scanner, a controller (control circuit CONT) for always controlling an inclination angle of said plurality of light emitting devices with respect to a beam scanning direction of said semiconductor laser light source, where the inclination angle (θ) satisfies the equation:

$$\theta = \sin^{-1}[P/MA]$$

where A is the interval between adjacent ones of the light emitting devices, P is the scanning pitch or interval between adjacent ones of the light beams on the scanning surface, and M is the magnification of the entire optical system (col. 3, lines 38-50).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to control the inclination angle of the semiconductor laser source based on the equation as taught by Kitamura in the device of Nakajima et al. since such adjustment is an old and well known practice in the printing art.

With regard to claims 4, 10, Nakajima et al. further teaches the controller for always detecting a position of the output beams in a direction perpendicular to the main scanning direction (via the synchronization detecting sensor 409) (col. 12, lines 43-48), as well as for controlling a predetermined pitch interval (P) of scanning lines owing to variation in relative position of each of said light sources (via pitch calculation section 412), and for controlling an inclination angle ($\theta 1$, $\theta 2$) of arrangement of said plurality of light emitting devices with respect to the beam scanning direction (main scanning direction) of each of said semiconductor laser light sources, respectively (col. 9, lines 25-31).

With regard to claim 11, Nakajima et al. teaches the interval between adjacent light emitting devices of the first semiconductor light source (1) and that of the second semiconductor light source (2) being equal to each other (Figs. 13-14).

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. in view of Kitamura as applied to claim 1 above, and further in view of Motoi (U.S. 5,539,719).

Nakajima et al., as modified by Kitamura, discloses all the basic limitations of the claimed invention except for the detector detecting a shift in time interval between moments at which the laser light beams pass over the detector.

Nevertheless, Motoi discloses an image forming apparatus including a light beam deviation detecting device (sensors B, C, Fig. 18) between the two laser light beams in the sub-scanning direction by detecting the time interval difference (T3) between the respective detecting time of arrivals (T1 and T2) of the two laser light beams.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Nakajima et al., as modified by Kitamura, with the aforementioned teaching of Motoi for the purpose of calculating and subsequently correcting the pitch interval of the scanning lines.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. in view of Arimoto et al. (U.S. 4,806,951).

Nakajima et al. discloses all the basic limitations of the claimed invention except for the use of the polarizing prism for directing the light beams toward the photodetectors.

However, Arimoto et al. discloses an optical printer having a plurality of laser light sources (11 and 12) emitting respective light beams, a portion of each of which is directed toward the beam-position detecting sensors (A1-A4) via the polarizing prism (10), the divisional photodetectors A1-A4 detecting the distance between [sub-]scanning lines (e.g., detecting the positions of the beams in the direction perpendicular to a scanning direction) such that the spacing of the scanning lines on the surface to be scanned is kept at a predetermined value (col. 7, lines 9-40).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the photodetectors and the polarizing prism as taught by Arimoto et al. in the device of Nakajima et al. such that the interval between the scanning lines is accurately adjusted to a desired value.

6. Alternatively, claims 1, 4, 7, 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. in view of Inoue et al. (U.S. 6,522,350 B2).

Nakajima et al. discloses a multi-beam optical scanning apparatus comprising two semiconductor laser light sources (LD1, LD2, Fig. 6) each including a plurality of light emitting devices arranged in a line at equal intervals, a beam scanner (rotating polygon mirror 403), a beam converging unit (cylinder lens 402), and a controller for always controlling an inclination angle ($\theta 1$, $\theta 2$) of said plurality of light emitting devices (LD1-R, LD1-L, LD2-R, LD2-L) with respect to a beam scanning direction of each of said semiconductor laser light sources (Fig. 7).

However, Nakajima et al. does not explicitly disclose the equation governing the inclination angle.

Regardless, the relationship between the inclination angle of the semiconductor laser light source, the magnification of the entire optical system of the scanning apparatus and the interval of the laser beam spots on the scanning surface is well known in the printing art as evidenced by Inoue et al. Indeed, Inoue et al. discloses an imaging device performing parallel scanning with a plurality of beams on an image recording medium, the device comprising several blocks of light sources, each having a plurality of light emitting elements arranged at equal intervals, the blocks of light sources are all inclined with respect to the sub-scanning direction by an angle θ satisfying the following equation:

$\cos \theta = d_s / a_s$ (col. 3, lines 2-17)

where ds is the distance between the light source surface dot and as the distance between the beam irradiation source, and the magnification being equal to 1.

If the inclination angle is defined with respect to the main scanning direction (α), the following equation would be resulted;

$\sin \alpha = d_s / a_s$

Inoue et al further teaches the magnification (m) being different than 1 (col. 4, lines 14-22 and col. 47, lines 7-15), such that the above equation becomes:

$\sin \alpha = d_s / m.a_s$

or

$\alpha = \sin^{-1}[d_s / m.a]$

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to control the inclination angle of the semiconductor laser source based on the equation as taught by Inoue et al. in the device of Nakajima et al. since such adjustment is an old and well known practice in the printing art.

With regard to claims 4, 10, Nakajima et al. further teaches the controller for always detecting a position of the output beams in a direction perpendicular to the main scanning direction (via the synchronization detecting sensor 409) (col. 12, lines 43-48), as well as for controlling a predetermined pitch interval (P) of scanning lines owing to variation in relative position of each of said light sources (via pitch calculation section 412), and for controlling an inclination angle ($\theta 1$, $\theta 2$) of arrangement of said plurality of light emitting devices with respect to the beam scanning direction (main scanning direction) of each of said semiconductor laser light sources, respectively (col. 9, lines 25-31).

With regard to claim 11, Nakajima et al. teaches the interval between adjacent light emitting devices of the first semiconductor light source (1) and that of the second semiconductor light source (2) being equal to each other (Figs. 13-14).

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. in view of Inoue et al., as applied to claim 1 above, and further in view of Motoi.

Nakajima et al., as modified by Inoue et al., discloses all the basic limitations of the claimed invention except for the detector detecting a shift in time interval between moments at which the laser light beams pass over the detector.

Nevertheless, Motoi discloses an image forming apparatus including a light beam deviation detecting device (sensors B, C, Fig. 18) between the two laser light beams in the sub-scanning direction by detecting the time interval difference (T3) between the respective detecting time of arrivals (T1 and T2) of the two laser light beams.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Nakajima et al., as modified by Inoue et al., with the aforementioned teaching of Motoi for the purpose of calculating and subsequently correcting the pitch interval of the scanning lines.

Response to Arguments

8. Applicant's arguments filed 03/10/03 have been fully considered but they are not persuasive.

The examiner respectfully disagrees with Applicants' arguments concerning the combination of Nakajima and Kitamura, the latter disclosing an angle of inclination being applied to a device having only one semiconductor light source with a plurality of light emitting devices such that one skill in the art would not be motivated to used the controlled inclination in a device having more than one semiconductor light source taught by the former. Firstly, the instant invention discloses the exact same claimed equation

governing the inclination angle with respect to both a single semsiconductor light source (Figs. 8-10) and a plurality of semiconductor light sources (Figs. 1, 3-4). Secondly, the discussed equation is conceived independently with respect to the relative position of the multiple semiconductor light sources, e.g. distance between the two semiconductor light sources. The only requirement consists of positioning each of the semiconductor light sources at the desired inclination angle. Therefore, one skill in the art would highly be motivated to control the inclination of the plurality semiconductor light sources in the device of Nakajima based on the single laser light source device of Kitamura.

With regard to Applicants' arguments concerning Arimoto for "the photodetectors A[1]-A4 and prism 10 do not detect the positions in a direction perpendicular to a scanning direction of the output beams of each light ssource as in the invention according to claim 3", the examiner respectfully disagrees. Arimoto teaches the photodetectors A1-A4 and the surface to be scanned being in a geometrically conjugate image-forming relation with respect to the sub-scanning direction, the photodetectors A1-A4 detecting the positions of the laser beams emitted by the plurality of semiconductor light sources (11, 12) and directed from the prism 10, such that the scanning lines are controllably spaced by a predetermined distance [in the ssub-scanning direction], e.g., the positions of the beams in the direction perpendicular to the scanning direction being detected by the divisional photodetectors A1-A4 (see Fig. 12, and related discussions at col. 7, lines 7-33).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C Pham whose telephone number is (703) 308-1281. The examiner can normally be reached on T-F (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin R. Fuller can be reached on (703) 308-0079. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722, (703) 308-7724, (703) 308-7382, (703) 305-3431, (703) 305-3432 for regular communications and for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

HAI PHAM
PRIMARY EXAMINER
April 19, 2003